

Direct Assimilation of AVHRR Satellite Radiance Measurements in a Reanalysis System

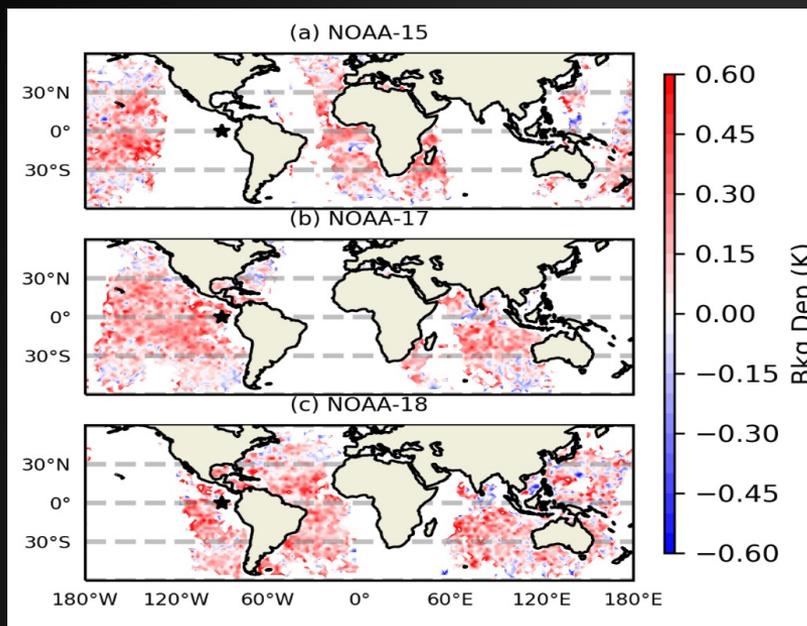


Figure 1

Advanced Very High-Resolution Radiometer (AVHRR) radiance observations can be used to fill gaps in sea surface temperature (SST) records. Three experiments were run comparing NASA GMAO's GEOS-FP to observed SST. Figure 1 depicts departure of skin SST with assimilated AVHRR data (EXP_AVHRR) from the background SST at 18 UTC, gathered from instruments onboard satellites NOAA-15, NOAA-17, and NOAA-18. These results show the mean of EXP_AVHRR is colder than observations over the tropical ocean, from 30°N to 30°S. The positive (warm) bias in the mean background temperature is not uniformly distributed and is larger during local daytime.

The difference in observation count in channels 115-130 of AIRS (Atmospheric Infrared Sounder, onboard Aqua) and the root mean square error (RMSE) between control (CTL) and analysis of skin SST (EXP_SST) is shown in Figure 2a, and between CTL and EXP_AVHRR in Figure 2b. The increase in observation count and reduction in RMSE by almost 3-4% with EXP_AVHRR suggest a positive synergy from the assimilation of AVHRR data, thus further reducing the variability in the surface sensitive hyperspectral channels already benefiting from skin layer parameterization. This new data has been added to GEOS systems.

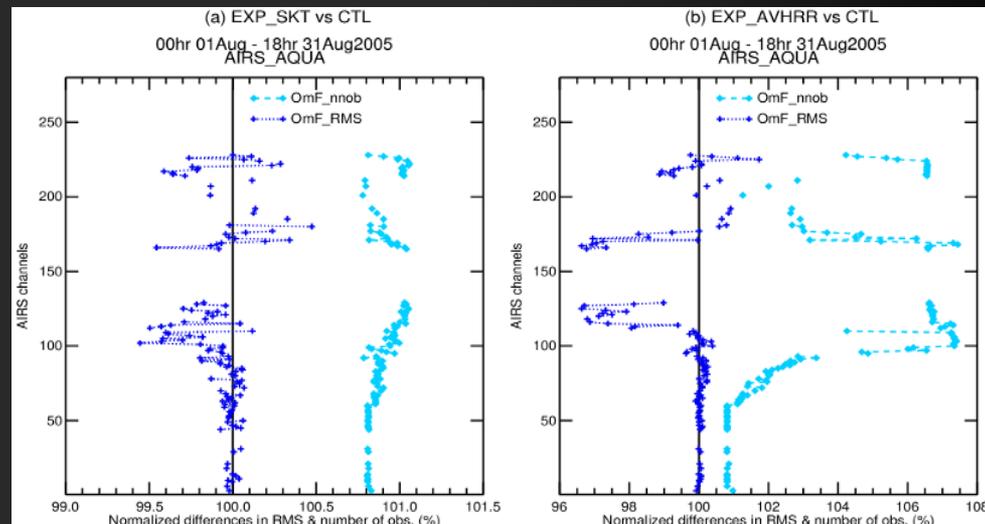


Figure 2